ADJUSTABLE SHORING POST

Field Of The Invention

The present invention relates to telescopic posts or shores, and more particularly to telescopic posts or shores with both coarse and fine height adjustment means.

Background Of The Invention

Conventional shores do not provide adequate utility when shoring slabs that are at a significant height. These shores, when being installed or stripped, generally require rotation of elements that are too high, necessitating elevating devices to raise a worker to a correct height, or too low, requiring a second worker to support the shore while a first worker strips or installs the shore. Further, often the torque required to strip these shores is greater than necessary due to the inefficient designs of these conventional shores. These deficiencies take on greater significance to the concrete contractor when using the expensive labor pool provided by modern affluent societies where workers are less inclined to take on very physically demanding work.

Telescopic shores generally consist of two sleeves or tubes where one tube fits into the other tube. For the purposes discussing prior art shores it is convenient to divide the field of existing shores into two broad classifications for easy reference.

Type 1

This is the most common shore configuration. Type 1 shores employ two mutually telescopic tubes that are pinned together at a point where the tubes overlap. A series of holes in the inner tube allows a coarse adjustment of the inner tube within the outer tube, where a worker can select the appropriate hole within the inner tube to create a shore that is approximately the correct height.

A threaded nut that cooperates with a mating thread on the outer tube is turned to provide fine adjustment and stripping. This threaded nut moves the pin up or down within the outer tube, thereby adjusting the position of the inner tube.

A first deficiency with type 1 shores is that the threaded collar operates at the diameter of the outer tube. This relatively large operating diameter requires the application of a large torque to release the shored load when stripping, often necessitating the use of a rapid release device. United States Patent 4,752,057 to Hagemes is a good example of both the type 1 shore and use of a rapid release device.

A further deficiency with a type 1 shore occurs when working with large shoring heights. If, for example, a type 1 shore is used to shore a 15 ft. (approximately 4.5 m) floor to ceiling height, the operating mechanism will generally be 7½ ft. to 8 ft. (approximately 2.25 – 2.5 m) above the floor. Obviously a worker cannot reach this height without the use of an elevating device.

In order to circumvent this deficiency, users sometimes add an extension to the outer tube and apply the shore upside down. This solution however raises the center of gravity of the shore, making erection more difficult and only partially solving the problem as the nut can still be too high to reach. Further, the problem of a large stripping torque needing to be applied remains irrespective of the orientation of the shore.

<u>**Type**</u> **2**

Type 2 shores, like type 1 shores, generally include 2 mutually telescoping tubes, where one tube fits concentrically within the other. Coarse adjustment is typically accomplished by inserting a pin through aligned holes in the outer and inner tubes at a point where the tubes overlap. The pin fixes the tubes together and prevents one from rotating within the other.

Type 2 shores make use of a device for fine adjustment and stripping that is located at the bottom of the shore. The fine adjustment and stripping device is usually a left and right hand screw or a screw and nut arrangement. These

devices provide the advantage of minimizing the torque required to strip the shore with a reduced screw diameter, but require the user to bend over or crouch to operate the device. With all but the shortest and lowest capacity shores the user cannot adjust the shore and keep it safely in an upright position without assistance from a second person. Examples of type 2 shores are taught by Canadian Patent No. 247,052 to Macivor, which includes the above described fine adjustment device, and Canadian Patent No. 445,378 to Roemisch, which includes a screw adjustment at the top instead of the bottom.

Summary Of The Invention

The present invention overcomes the deficiencies of the prior art by providing a telescopic shore in which fine adjustment can be accomplished by turning one tube while the other remains stationary. The tube that is rotated can be grasped at a location between a worker's shoulders and knees.

The invention employs two mutually telescopic tubes in the same fashion conventional shores do. The larger of the two tubes (outer tube) is usually positioned above the smaller one (inner tube). The outer tube includes a rotating collar at one end in which a hole for a pin is located.

The vertical load in the outer tube is transferred to the inner tube via a pin that engages the inner tube. The use of a rotating collar on the outer tube ensures that the smaller inner tube can be rotated without rotating the outer tube. It may be desirable in some instances to reverse the orientation of the tubes with the smaller tube above the large tube and arranged in a similar fashion to the foregoing such that the larger lower tube can be rotated without rotating the upper smaller tube.

Coarse adjustment, typically within 3 inches, or approximately 7.5 cm, of the desired length, is provided by inserting a pin in a series of equally spaced holes provided in the smaller inner tube as is typically found with conventional shores.

Rotating the lower tube (inner or outer tube) provides fine adjustment. This lower tube has either a nut or a threaded cylinder attached to its lowest end

that cooperates with a corresponding threaded cylinder or nut attached to the base plate of the shore.

The nut/threaded cylinder assembly providing fine adjustment can be made with a significantly smaller screw pitch diameter than the screw pitch diameter used on a conventional type 1 shore. As indicated above, in a type 1 shore the screw diameter is larger than the diameter of the larger outer tube. As the torque required to strip the shore varies directly with the screw pitch diameter, the present invention offers the advantage of significantly reduced stripping torques.

Further, the user does not need to reach to the bottom of the shore to make a fine adjustment. A single person can easily steady the shore with one hand while turning the inner or outer tube as the case may be with the other hand to make fine adjustments or strip the shore.

The present invention therefore provides a shoring post comprising: i) an outer tube; ii) an inner tube slidably received within said outer tube, at least one of said inner tube and said outer tube being rotatable relative to the other; iii) coarse adjustment means for limiting travel of said inner tube into said outer tube, said coarse adjustment means having: a rotatable collar located at one end of said outer tube; and an affixing means for affixing said collar to said inner tube; and iv) fine adjustment means at one end of said post, comprising a threaded cylinder and a threaded receiver, wherein a selected one of said threaded cylinder and threaded receiver is integral with a selected one of said outer or inner tubes, whereby rotation of said selected one of said outer or inner tubes effects said fine adjustment.

Brief Description of the Drawings

The present invention is better illustrated in the drawings, in which:

Figure 1 is a front elevation view of one embodiment of the present invention;

Figure 2 is a front elevation view of further embodiment of the present invention in which the outer tube is located below the inner tube;

Figure 3 is a front elevational view of further embodiment of the present invention in which an alternative base plate is used;

Figure 4 is a top plan view of a collar used in the present invention;

Figure 5 is a front elevational view of the collar of Figure 4;

Figure 6 is a front elevational view of the shore of Figure 1 on which an extension at the upper end of the outer tube has been fitted; and

Figure 7 is a front elevational view of the shore of Figure 1 in which a drop head assembly has been fitted in place of the top plate.

Description of the Preferred Embodiment

Reference is now made to the drawings. Figure 1 shows a preferred embodiment of the present invention. A shore 25 includes an outer tube 1 and an inner tube 2. Inner tube 2 is adapted to fit, preferably concentrically, within outer tube 1. In the embodiment of Figure 1, the bore of outer tube 1 is only slightly larger than the outside diameter of inner tube 2 such that the two tubes telescopically cooperate with respect to each other with a minimum of clearance just sufficient to allow easy movement of the inner tube within the outer tube.

A collar 3 is rotatably placed about a lower end of outer tube 1. In the embodiment of Figure 1, collar 3 can merely provide a support on which outer tube 1 rests.

Collar 3 can include a handle portion 30, as seen in Figures 4 and 5, to aid in stripping shore 25. Handles 30 may include holes 15 for insertion of a bar if improved leverage is required for stripping shore 25.

Coarse telescopic adjustment of inner tube 2 is accomplished by means of a pin 4 that passes through a hole 16 in collar 3 and into inner tube 2. Inner tube 2 has been drilled with a series of through holes 14 provided to receive pin 4 in different vertical positions and thereby provide course adjustment of the shore length.

As shown in Figure 1, a nut 7 is fitted to the lowermost end of inner tube 2. Nut 7 cooperates with threaded cylinder 8 such that rotation of inner tube 2 causes inner tube 2 to rise or fall depending on the direction the inner tube 2 is

rotated. Threaded cylinder 8 is fixed to base plate 11 whose function is to spread the load over the supporting slab (floor). This prevents the slab from being damaged by the high load concentration that would result if base plate 11 was not in place.

A top plate 12 is mechanically fastened (bolted) to the uppermost end of outer tube 1 via bolt lugs 13 to receive the load (beam or panel) being supported. The top plate 13 can be made in a number of different configurations commonly used in the industry such as a "J-head" and a "U-head" all of which can be interchanged to suit the intended application. A drop head assembly 19 can likewise be installed in place of the top plate as shown in Figure 7.

Erecting shore 25 is accomplished by coarsely adjusting inner tube 2 within outer tube 1 using pin 4. This coarse adjustment brings the length of shore 25 to usually within 3" (approximately 7.5 cm) of the desired length. Fine adjustment is then accomplished by rotating collar 3 or inner tube 2, thereby rotating nut 7 on threaded cylinder 8, causing shore 25 to be raised or lowered to the desired height.

In practice the length of shore 25 is adjusted to an approximate length that is a little less than the theoretical floor to soffit height before it is elevated into a vertical position. Once shore 25 is properly positioned, inner tube 2 is rotated (by rotating collar 3) to obtain the final height. The user must be aware that at least one inch (2.5 cm) of thread must to be visible on threaded cylinder 8; otherwise shore 25 cannot be stripped.

Stripping shore 25 is accomplished by rotating the inner tube 2, preferably with the use of a bar inserted through either holes 14 or 15, or by hammering on collar 3 to lower the complete assembly. A portion of the visible thread allowance on threaded cylinder 8 referred to above is used for this purpose.

Reference is now made to Figure 2. Figure 2 shows an alternative arrangement for shore 25 in which outer tube 1 is located underneath inner tube 2 when installed. Nut 7 is located at the bottom of outer tube 1 and collar 3 is rotatably affixed to the top of outer tube 1.

One skilled in the art will appreciate that the configuration of Figure 2 works nearly identically to the configuration of Figure 1. The principle difference between the two is that the user now rotates outer tube 1 to strip shore 25, rather than rotating inner tube 2.

Figure 3 shows a further alternative arrangement. In Figure 3, the outer diameter of inner tube 2 is significantly less than the inner diameter of outer tube 1. In order to accommodate this, a washer 5 is used to accommodate collar 3, and a stabilizer 6 is added to the end of inner tube 6. Stabilizer 6 is comprised of highly durably material, preferably hardened steel, to accommodate the forces imposed on shore 25 under load.

A further advantage of stabilizer 6 is that it prevents inner tube 2 from being removed from outer tube 1, thereby eliminating the possibility of separation, for example, during transport.

Washer 5 is bolted to outer tube 1, and includes a flange that can fit into a shoulder 28 on collar 3, as best seen in Figures 4 and 5. One skilled in the art will appreciate that other affixing means, including snap rings, can be used to rotatably attach collar 3 to outer tube 1. Thus washer 5 allows rotation of collar 3 at one end of outer tube 1. One skilled in the art will appreciate that shoulder 28 is not necessary if washer 5 is not used.

The configuration of Figure 3 further includes a threaded cylinder 9 that is part of inner tube 2. A base plate 11 includes a nut 10 that cooperates with threaded cylinder 9, thereby allowing fine adjustment.

Reference is now made to Figure 6 and 7. An extension 18 can be fitted to either end of the outer tube 1. The extension 18 is installed by removing top plate 12 and bolting the extension 18 onto outer tube 2 with bolts passing through bolt lugs 13 on the top of the outer tube. The top plate 12 in then reinstalled using bolts that engage bolt lugs 13 that are attached to the upper end of extension 18. In Figure 7 a drop head assembly 19 is affixed to the top of extension 18 rather than top plate 12.

Extension 18 can be readily fitted to increase the length of the shore 25 without jeopardizing the foregoing advantages. While extension 18 would

normally be fitted to the outer tube 1 to ensure maximum load capacity at the longer length, as will be appreciated, there are no fundamental reasons that prohibit fitting extension 18 to inner tube 2.

One skilled in the art will realize that in any of the configurations of Figures 1 to 3, 6 and 7, a number of means can be provided to apply the necessary torque required to strip shore 25. If shore 25 is configured with inner tube 2 at the bottom the user can insert a bar in holes 14 provided for coarse adjustment or in holes 15 provided for this purpose in the collar. In the event the outer tube 1 is at the bottom, a strap wrench could be employed to turn the outer or some special purpose lugs/handles could be fitted to the outer tube at a convenient height. If the outer tube is made from an aluminum extrusion, ribs could be economically provided on the outside of the outer tube to cooperate with a special wrench designed for the purpose of stripping the shore.

One skilled in the art will further appreciate that using a collar 3 that is affixed to the inside of outer tube 1 reduces the torque required to strip shore 25. Any friction between collar 3 and outer tube 1 will be at a diameter that is less than the diameter of outer tube 1, thereby reducing the torque required. Further, the actual stripping occurs around threaded cylinder 8 or 9, which have diameters that are equal to or less than the diameter of the inner tube 2. This also reduces the torque required for stripping. This characteristic also eliminates the need to use special quick release devices that are commonly employed with conventional shores.

Shore 25 further provides the advantage that the user has the capability of adjusting/stripping the shore by applying a force to cause rotation at a working height between his knee and shoulder irrespective of the length of the shore. This allows a single worker to install/strip the shore without the need for an elevating device or a second worker to support shore 25 while the first worker is bending or kneeling to operate a low adjustment device.

The elements of the present invention lend themselves to be manufactured from any number of materials. Aluminum and steel are obvious

choices, either alone or in combination. However, one skilled in the art will realize that non-metallic tubes can also be used.

The above-described embodiments of the present invention are meant to be illustrative of preferred embodiments and are not intended to limit the scope of the present invention. Also, various modifications, which would be readily apparent to one skilled in the art, are intended to be within the scope of the present invention. The only limitations to the scope of the present invention are set forth in the following claims appended hereto.

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